

IDENTIFICATION AND STRENGTHENING OF ENVIRONMENT RELATED VALUES AT SECONDARY LEVEL.

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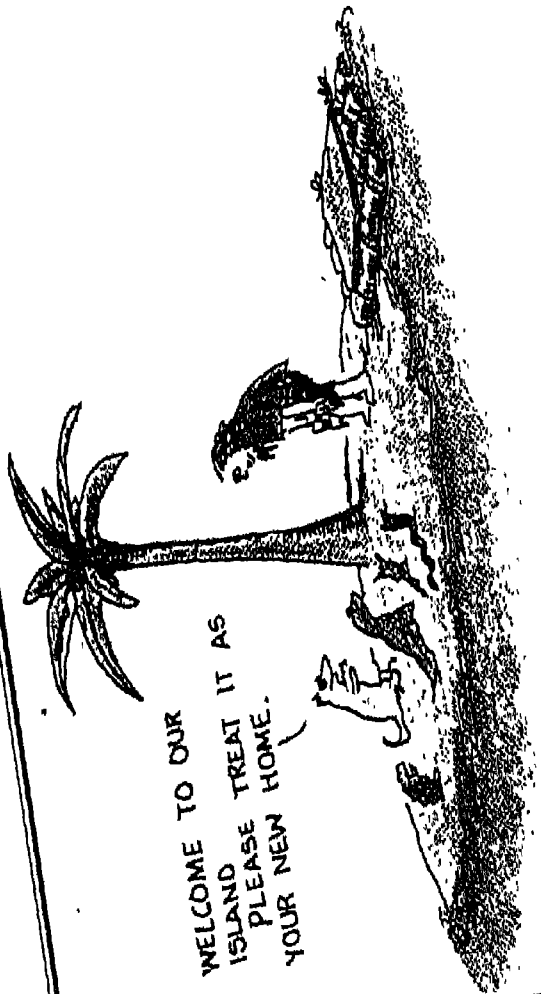
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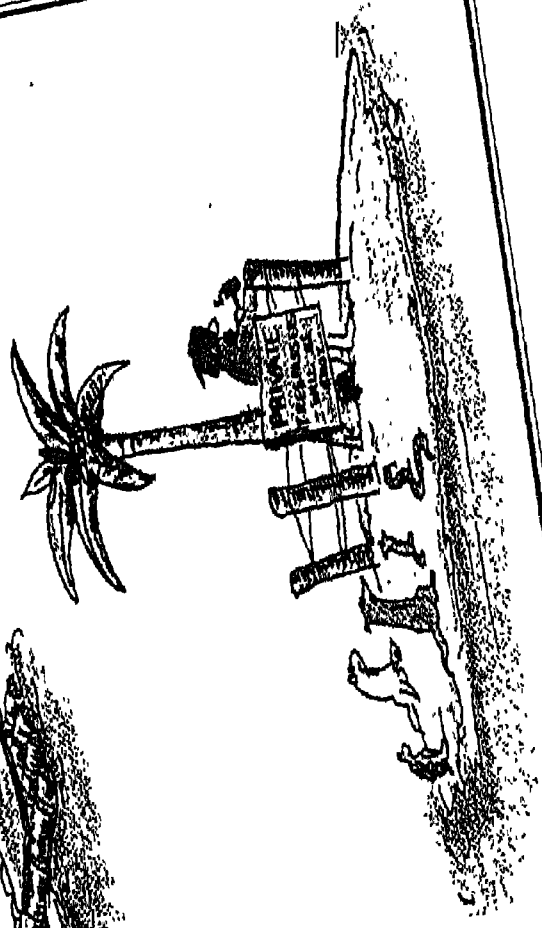
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WELCOME TO OUR
ISLAND TREAT IT AS
PLEASE TREAT IT AS
YOUR NEW HOME.



PREFACE

Awareness of the physical environment is not, by any means, something recent. Man, ever since he appeared on earth, became a part of his environs. Primitive man, when he had time to look around, observed nature in all her pristine beauty, splendorous and mysterious. The splendors made him joyous and the mystery kindled awe and curiosity. This is how the wonderful synthesis of the physical world with the individual soul began.

The Indo-Aryans lived in the midst of the grandeur and sublimity of nature. The towering snow peaks of the Himalayas, the gigantic rivers, the vast, green meadows, the boundless seas, the ineffable splendor of the seasons - all produced an abiding effect upon them. Nurtured amidst such an environment, the Aryans in India must have developed a deep, introspective mind, which separated them from the rest of the world.

Today we no longer think of nature as a personified being. What we think of this mysterious power is rather difficult to say in simple language, but as the word 'nature' has become one of the most significant concepts in science and philosophy, it is worth our while to see whether we mean when we use it. Nature is another word for 'law'. It means 'birth', coming to us from the Latin word 'nature' but it means 'birth without a bias'. We see that it is not correct to speak of nature as something that lies far behind us in the past. When we speak of nature, we are thinking of a continuous process. This is a basic concept of modern thinkers in the study of nature and environment. Nature is in the going forward of the physical universe.

Now arises this searching question – having understood so much about nature and environment, why is man responsible for undermining the very environment he is living in? Let us analyse this in some detail.

There are many ways in which the vast forces of nature dominate the life of man. These forces were there when primitive man in the early era of human history struggled hard with the elements of nature for his survival; and they are here very operative when the urban affluent mechanically regulates the temperature of his surroundings for his comfort. In fact, man may regard the history of civilization as a progressive control over nature. Man is meant to be a master, not a slave; and every advance in material progress would free him more completely from the limitations which nature has set for him. With this view in mind, or shall we say, 'ego', man began utilising environmental resources to meet his ever increasing wants for a better living. But alas! He has trespassed too far, to the extent of causing serious ecological and environmental imbalances. Indiscriminate cutting down of forests has led to the extinction of many a species of flora and fauna. Deforestation has eventually led to erosion, which in turn has caused floods. In spite of modern technologies erosion and flooding are ever on the increase all over the world. Deserts are also expanding on the globe. As a result of increased industrialization the percentage of carbon monoxide and sulphur dioxide is increasing in the atmosphere. The unabated use of insecticides and pesticides, and the industrial and nuclear fallouts, fly ash and particulates are increasing pollution in alarming proportions in the atmosphere. Untreated industrial waste and city garbage disposed of in the oceans are toxic to marine life. Only a few instances have been quoted here to illustrate how human activities have created imbalance in the environment.

As usual, man, after having gone too far in exploiting nature, has of late come to realise that the environmental conditions have degraded to an alarming positions and the time has come to take remedial measures.

Environment is now under serious threat and it has become a global enigma. Natural ecosystems are increasingly being stressed by various developmental activities. Development is necessary for improving the quality of life of the people but it should in no way disrupt the ecological harmony. Rapid increase of human population and excessive consumption of matter and energy are the root causes of environmental crisis. Mankind has become the most powerful organisms to disrupt and disrupt the natural ecosystem. It is, therefore, very urgent that we may diagnose the malady and adopt preventive creative measures through environmental education (EE)

The environmental education, its ultimate aim is to create awareness, behavioural attitudes and values directed towards preserving the biosphere, improving the quality of life and natural environment including flora and fauna. In EE, the values development strategies that are expected to yield the best results are those, which emphasize the provision of opportunities for learners to act on their values. A value is not developed unless it manifests itself. Teaching values and attitudes of social responsibility towards environment requires a certain level of achievement and maturity on the part of the student. A student cannot appreciate environmental based values, if he has not mastered the basic principles and facts about environment

It is in this context that the present programme is contemplated to formulate various activities and experiments, which will help teachers to teach lessons, related with environment and to provide every student to acquire the knowledge and values from it.

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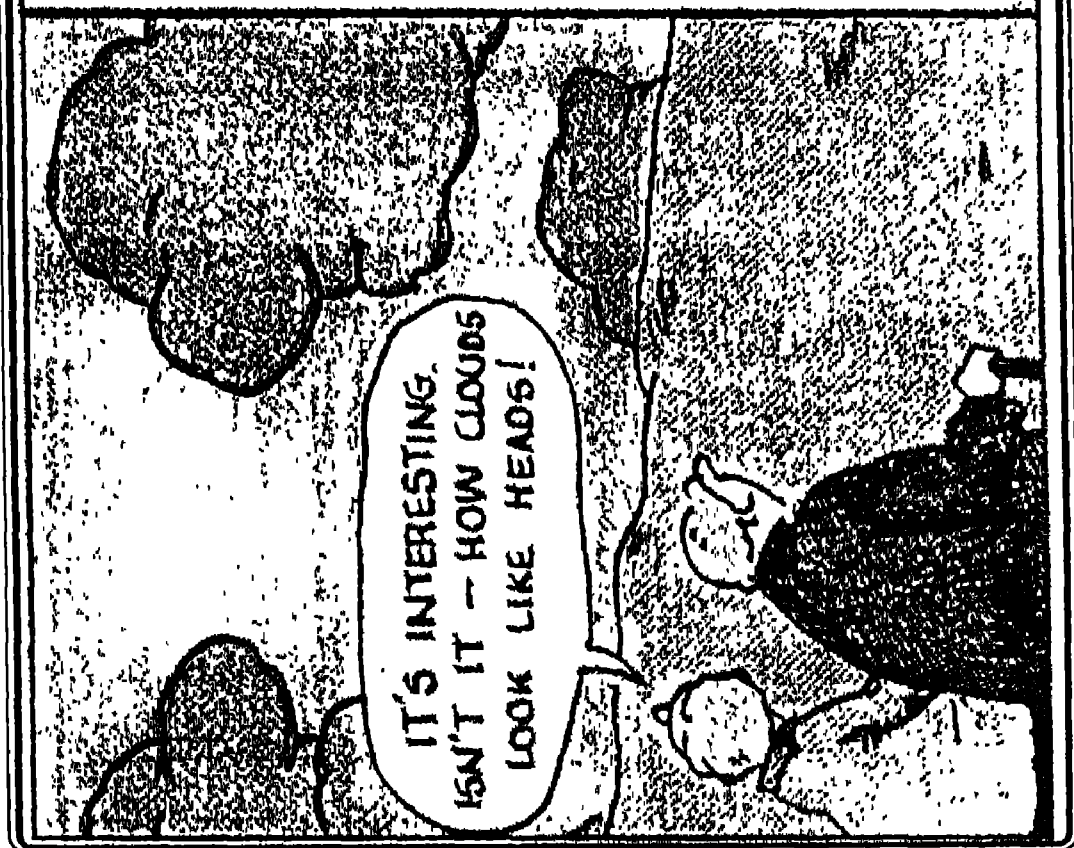
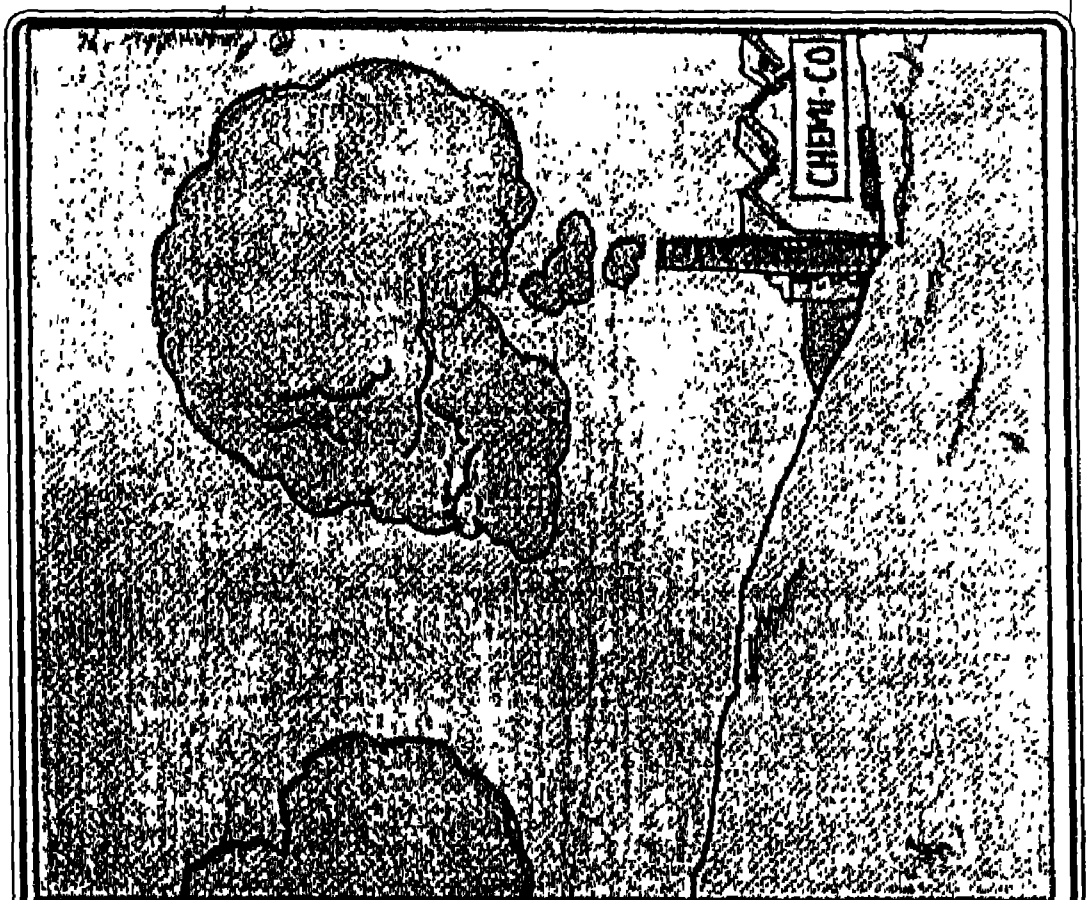
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APPROACH PAPER

OBJECTIVES

To analyse the science textbooks of secondary level of CBSE AND Rajasthan State Board for

- (a) Identification of content and process activities relevant to the EE values existing in the Science & Technology textbook at Secondary Level.
- (b) To identify the additional alternative process activities for smooth transaction of environmental related values.
- (c) To develop instructional material and lesson plan with which those values can be taught most effectively.

METHODOLOGY

The project is planned to be completed in three phases spread over a period of one year.

PHASE I: In House Workshop: The content analysis of Science Textbooks of Secondary Level (CBSE & State Board of Rajasthan) to delineate the environment related values by a team of internal resource persons and two experts from outside. The workshop would be organised to achieve objectives of (a) & (b).

PHASE II: Collection - To collect innovative strategies and process activities conducted by other organisation for value inculcation.

PHASE III:Workshop For Validation and Finalisation of Identified

Values: Information generated through Phase I & II of the Programme will be exhaustively reviewed and validated by analyzing proposed activities by a team of experts alongwith school teachers in Biology. An appropriate action plan for the promotion of environmental values will be formulated. The report will be finalised for review and under dissemination.

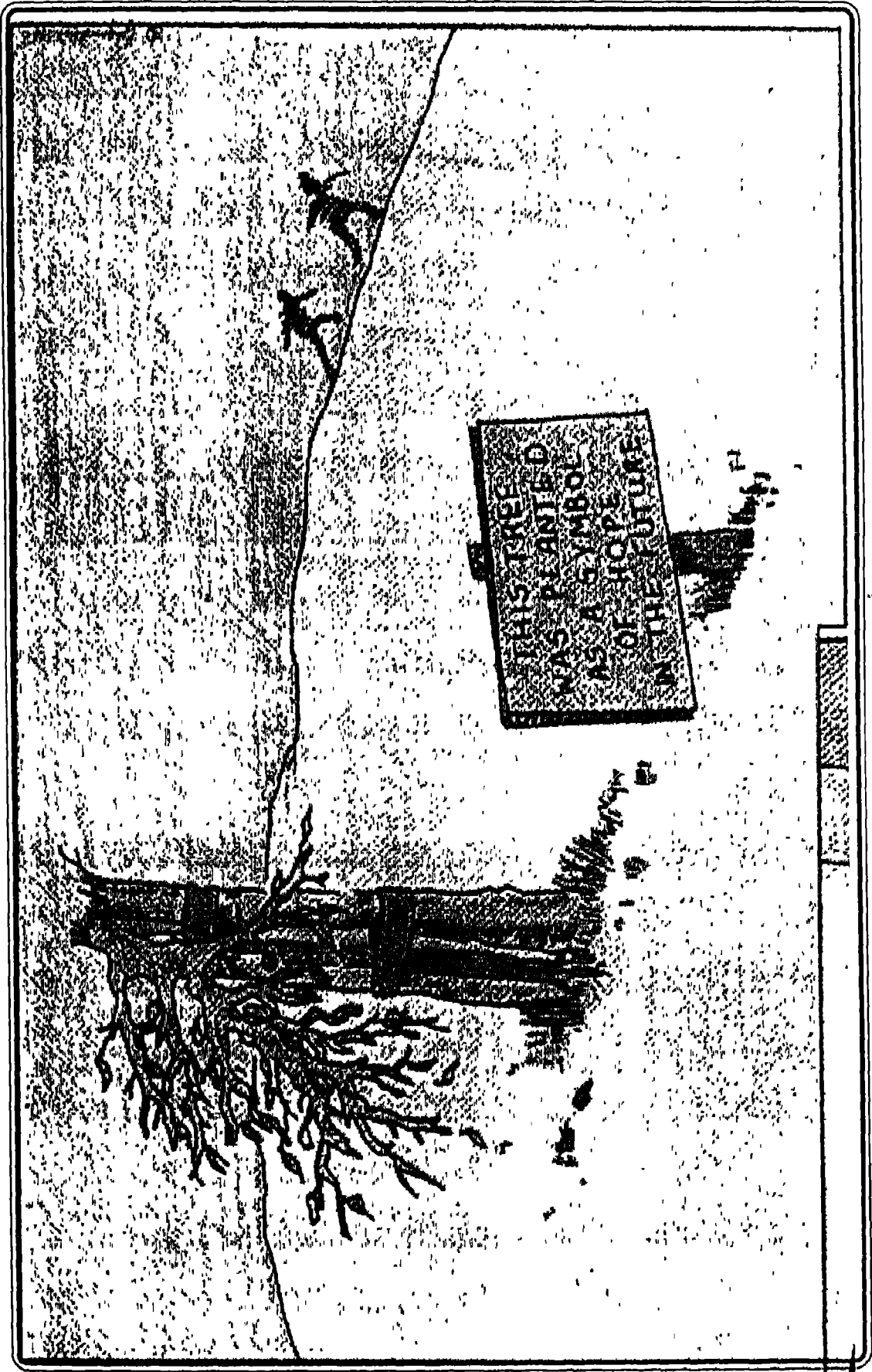
TIME SCHEDULE

PHASE I	November, 2002
PHASE II	December 2002 - January 2003
PHASE III	January – February 2003

ACTIVITIES AND EXPERIMENTS FOR TEACHING LEARNING THE VARIOUS ASPECTS OF ENVIRONMENT AND RELATED VALUES AT SECONDARY LEVEL

Environmental education is meaningful when knowledge gained by the learners can be applied to everyday life. It is meaningful only if the skills developed can be utilised in dealing with problems or difficulties encountered in life. These may be achieved by the inclusion of activities and experiments that will provide students with opportunities to make decisions or choose between alternatives on current issues.

The various activities and experiments suggested are aimed to help teachers teach lessons related with environment and to provide every student to acquire the knowledge and values from it.



A. HABITAT AND ADAPTATION

Objectives

- 1) To define habitat and different types of habitat of organisms.
- 2) To define adaptation and significance of adaptation.
- 3) To know various adaptive features of organisms for different modes of life.

Suggested Activities/Experiments:

Activity 1: Visit local habitat like school garden, pond etc. Make a list of all plants and animals observed. Record the observations as follows:

- a) observe all animals found in water/land
- b) observe all plants found in water/land
- c) observe basic differences (modified) between aquatic and terrestrial organisms.

Learning outcome: (i) Students will be able to differentiate aquatic and terrestrial organisms (ii) Organisms require special characters for specific habitat.

Activity 2: Select any pond/lake adjacent to your house. Visit that pond or lake along with your friends or parents You will observe some hydrophytic plants growing in pond/lake. Identify different categories of aquatic plants, such as

- (a) Eichhornia (water hyacinth) with poorly developed root system.
- (b) Ceratophyllum, root absent,

- (c) Lemna, with reduced stem,
- (d) Nelumbo (lotus). With long slender, flexible and spongy stem. Stem is spongy due to presence of aerenchyma (large air containing cavities), which makes the plant buoyant. Leaves are large, flat with upper side waxy due to contact with air.
- (e) Vallisneria and hydrilla. Leaves are delicate, ribbon shaped or dissected
- (f) Utricularia. Submerged but rooted plant with highly dissected leaves. It is an insectivorous plant.
- (g) Record the data. Draw the diagrams and show it to science teacher

Activity 3: Notice carefully few animals that live in different types of habitat in your locality. Compare external features and mode of locomotion in the animals of each habitat. Prepare a table of (i) type of habitat (ii) name of animal and adaptive characters.

Activity 4: Visit the local pond, lake, hill and desert. You will find many plants and animals living there. Such residences are their habitat. Prepare a list of plants and animals with reference to their habitat

Activity 5: Observe leaves of aquatic plants like water lily which is circular disk shaped and floats on water so that it can perform photosynthesis and produce its own food. The body of leaf is coated with a waxy substance making the leaf water proof and the water does not decay, shrinks or wrinkle the leaf. The oily coat of leaf function is similar to the scales of a fish which keep the skin water proof. Take any aquatic plant like Hydrilla, Nymphaea, Water hyacinth. Cut the petiole (Stalk of the leaf) of water lily

(Nyamphaea) and observe the large air cavities that are present. Explain why these air cavities are present. Note if you go on a field trip, the various types of plants and animals you see are in marine and fresh water bodies. Note the plant and animal's forms seen in fresh water bodies and marine water bodies. Also, note the differences between the organisms in the two habitats.

Activity 6: Put a drop of water on a glass slide. Collect from a pond the green alga spirogyra and keep a filament in the drop of water placed on the glass slide. Cover the drop of water with the help of a cover glass and observe under microscope. Now from the side of the cover glass introduce concentrated salt solution and after some time observe the spirogyra cells. You will note that the cell protoplast shrinks in size. Now flood the slide with water once again and observe the cells after some time. You will notice that the cell protoplasts have returned to the normal size and shape.

Now try to relate this activity with the occurrence of organisms in specific habitats; for example marine organisms cannot exist and survive in fresh water and vice-versa

Activity 7:

- a) Take some amount of loose soil from the garden and put it on the table.
- b) Switch on the fan
- c) Observe that soil blows away.
- d) Now take soil along with the grass.
- e) Keep it under the fan.
- f) Observe that soil is held by the grass and does not blow.

Learning outcome: Soil erosion is checked by plants.

Activity 8: Observe any house under construction in your vicinity. Try to locate the foundation, you will find small insects, sometimes lizards and frogs. After filling foundation with concrete and cement, these animals are permanently buried.

Analyse what we have lost

Activity 9: You have seen in documentaries and pictures about cutting of trees and burning of forests to provide land for human colonies/factories/industries etc. List the plants and animals killed in such an activity. Co-relate this with the incidences of natural disasters like flood because forests prevent erosion of topsoil and prevent floods

Activity 10: Visit a pond nearby your locality along with your class fellows or parents and you may find some animals in or near that water body. Also collect some pond water in a small bottle and observe one or two drops of water on a slide under a microscope in your school laboratory. Make a list of these animals, their morphological characters and type of locomotion being performed by them.

You may see following animals.

- (a) A few fishes swimming in water.
- (b) A few frogs (especially in rainy season) either sitting on the bank of pond or jumping or floating or swimming in water.
- (c) A few water beetles swimming in water.
- (d) A few insects moving on the water surface.
- (e) Dragon flies hovering over the water surface

- (f) Microscopic examination of pond water may show the presence of amoeba, paramecium, euglena, certain algal forms and bacteria.

Activity 11: Visit a lawn or field nearby your locality and make a list of observed animals, their morphological features and type of locomotion performed by them. You may see following animals

- (a) Certain earthworms creeping on heaps of their worm castings (faeces) on moist soil,
- (b) Certain insects camouflaging with the green leaves and flying on your approach
- (c) Certain beetles walking on the soil

Activity 12: Visit a vacant dry land area near your locality where you may find the following animals

- (a) Some rats or their burrows in the area.
- (b) Some grasshoppers sitting on the leaves of Ak-plants (milkweed plants).
- (c) Some lizards or snakes may also be seen

Tabulate these animals with reference to their habitat and adaptive characters noticed in them.

Related values or identified values:

- Discipline
- Non-interference
- Co-existence
- Equality
- Living with simplicity
- Live and let live
- Allow of action of nature
- Co-operation



B. STRUCTURE AND FUNCTION OF THE ECOSYSTEM

Objectives:

- 1 To define and identify the components of an ecosystem.
- 2 To describe the elements of a food chain and a food web.
3. To describe the conditions needed for the ecosystem to maintain itself.
4. To understand the principals of self-regulation of an ecosystem.

Suggested Activities/Experiments

Activity 1: Visit nearby forests, lake, river, deserts and analyse in respect to biotic (living) and abiotic (non-living) components in each unit of your observation. Discuss how these components of nature interact? Based on the observation of a small unit, structure & function of biosphere can be can be conceptualized

Activity 2: Examine a garden or a park or an aquarium in your vicinity. Analyse the component in such artificially created ecosystems and compare with naturally occurring ecosystems of your vicinity like a small forest or hill side or a desert

Activity 3: Field trip to an area where students can identify the different components of the environment. Decide on the kind of place to study – a grassy field, a forest, or a coastal area. Before the trip, let the students prepare a list of the living things they expect to find within the area. Divide the class into small groups

Let the groups do the following activities:

Mark off several plots of about one square meter on a large grassy field or a forest, or a coastal area whichever is selected by the class. Assign four to five students to every plot. Ask the students to make an inventory of the different plants and animals in it. Allow them to study closely the characteristic of these organisms. They should compare the re-trip list with the list they made in the field. Inferences can be made as to why some organisms they expected to find in the area are present and why others are not.

Discuss the data observed during field trips. Back in class, ask the students to prepare a list of organisms with respect to eating habits & life-spans. Students may also be asked to classify organisms under following headings – producers, primary, secondary & tertiary consumers and decomposers.

Activity 4: Ask the students to prepare a mini-ecosystem as a project. Let students arrange the following in layers at the bottom of a large glass jar or aquarium: 5 cm of sand, 2.5 cm of dried straw and 5 cm of garden soil. Small ferns, lichens, fungi and small animals may be placed on the soil. Wet the sand and cover the jar or aquarium. The mini-ecosystem in the large glass jar or aquarium can be observed everyday for two or three weeks in the classroom or in the laboratory.

Activity 5: Survey the different aquatic ecosystems in the locality. Students can be made to identify the streams and lakes, find out their names, location and present condition: one of these ecosystems can be studied in detail: (1) its physical characteristics of water with reference to – color, odor & temperature, etc; (2) the living organisms in it; (3) the uses of the water to

the community; and (4) general condition – polluted or not polluted, and if polluted , the possible sources of pollution

Activity 6: Let the students identify an important part of their environment that is undeveloped. Ask them to imagine and describe or draw how they think the place looked some years ago or as far back as they can remember. Let them explain the possible causes of the change, if any. Then let them describe how they intend to develop it into an ideal community, given the money. Let the other members of the class consider the possible effects of these changes on the environment and then evaluate them

Activity 7: Present pictures or samples of different organisms which students have identified and described as to habitat, food eaten, feeding habits, etc. examples of common organisms maybe presented first, followed by the less familiar ones which students had researched on. Ask students to discuss the relationships among these organisms, and then develop a model based on “who eats who” From the discussion, bring out the idea of food chains and food webs emphasizing the concept of producers, consumers and decomposers.

Activity 8: Simulation activities: the “web Roles” Game: This is a role-playing activity devised by Jim Connaly (Science Teacher, Dec. 1977). It is aimed to provide the students with the experience that will lead them to appreciate the interdependence of animals and the natural balances within ecosystems

The activity begins with students drawing a card from a set to determine which role each is to play. Each card which is color coded contains information about a specific animal such as what food it eats, how it

avoids its enemies, and how it takes care of its young. Some animals represented are predators others are prey. Animals to be used should be those students are familiar with.

After finding out what animal to represent, each player is required to answer questions printed on Card A. The questions deal with problems animals of his kind encounter and how they can survive. Instructions on what the students are supposed to do and other facts about the animal are printed on Card B. Each student should imagine the 2 ½ hours spent in the activity as equal to four days. During this time, the students think of themselves seeking shelter and food and avoiding predators. The players are supposed to be backing 2 ½ hours if they survived, and report immediately if caught by predators or if they starved.

When everybody is ready, the prey is released. As soon as they are out of sight, the predators follow. At the end of the specified time, the students meet and discuss their experiences. From this simulated experiences, conclusions can be drawn about the functions of the ecosystem. The activity should be a real model of a food web.

The activity ends with students answering questions in Task Card C. Some examples of questions in Connally's Task Card C are: What food sources did you find? What food sources were you able to obtain? What does your food supply depend on? How has man affected your food supply?

Activity 9: Field trip

Divide the class into groups of 4 or 5. Allow them to take a walk around different places such as the schoolyard, the neighborhood, a park or

some nearby place to observe. In their walk, ask the students to do the following

- a. describe and draw the plants and animals they see on different lands
- b. describe what each animal uses for food (If this cannot be observed, they may have to read about these animals to find out).
- c. state which feeds on what plants, or animals or both

Discuss and compare group observations. Each group should prepare a chart showing all the organisms. Using arrows, ask the students to link the organisms, to make a food chain. Make them think of a larger ecosystem such as the sea, or a forest.

Activity 10: Another activity which students can do out in the field is to make them look around for evidences of a food chain. Let them draw the food chain and determine if any part of this chain is endangered. Ask how a break in the chain would affect the ecosystem and what can be done to make sure that it is not broken.

Activity 11: Possible effects of relocating an organism from its usual habitat to a different one can be a topic of discussion after the lesson on habitat. Emphasize the effects of changes in the conditions in the community of the organisms in it. Study also the effects of other limiting factors to population growth such as temperature and salinity.

Activity 12: Present photographs of water body, such as - a river, a lake or a bay. Or bring the students to any of those sites. Back in the classroom, let students state inferences about the condition of the body of water. Assign

someone to write these inferences on the board. Based on these, let students think of possible reasons for the conditions. Let them formulate these statements into hypotheses. Divide the class into groups and allow each group to choose the hypothesis it desires to test. Have them submit their plans. It may be necessary for the teacher to help them get the necessary reference books and equipment.

Related values/Identified values.

- Quest for knowledge
- Reasoning
- Keen observation
- Love for nature

C. ENERGY FLOW IN THE EARTH ECOSYSTEM OR ECOSPHERE

The suggested activities and experiments are aimed to show how solar energy reaching the earth is absorbed by air, water, land, plants, animals, and other materials in the ecosystem, and how the energy is changed to some other form.

Objectives:

1. To describe how the various sources of energy on earth can be traced back to solar energy
- 2 To identify the different alternative sources of energy affecting the earth and indicate their relative importance.
- 3 To determine a possible solution to the energy crisis experienced in many parts of the world

Suggested Activities/Experiments

Activity 1: Enumerate some materials used as sources of energy Let students trace each one back to its original energy source Examples heat energy from burning gasoline, water from the tap or flowing from mountain spring etc

Classify certain natural resources used into renewable or non-renewable resources. Make students report on how fossil fuels are formed

Assign students to research and report on various sources of energy other than fossil fuels. Some of these are solar, geothermal, nuclear, biogas,

tides and others. Follow this up with a debate on which of the possible alternative sources should be developed in the country.

Follow up the discussion of the uses of coal with a film presentation on how coal is mined. If a film on this topic is not available, slides or mounted still pictures showing the processes or steps involved in coal mining can be used. Allow students to analyze these processes and to give their stand on the following.

- a. How does coal mining affect the environment?
- b. Knowing the economic importance of coal, would you still allow coal to be mined? Why or why not?
- c. What can you do to conserve this non-renewable resource?
- d. Work out a plan on how you will carry out this idea.

Activity 2: Let students collect clippings from newspapers and magazines or articles or news items about plans for a large building project, such as a nuclear plant, geothermal plant or a dam. Let them find out the importance of each project. This is to be reported in class

Follow up each report with a discussion on how the project will make life easier for the people and how the project will eventually affect the ecosystem

Activity 2(A): Discuss the advantages and disadvantages of producing electricity from solar, nuclear, geothermal energy and the energy of flowing water. Ask students to choose which they would recommend for future installation in their community if funds were available. Discuss why

Activity 2(b): Panel discussion can be done on the conflicting interests in setting up priorities for distribution of fossil fuel as gasoline. The problem to be resolved is: which should be given priority if gasoline is to be rationed? Which use should be given a bigger percentage of the gasoline supply? The choices are cars, public transport system, industries, and domestic users. The pros and cons of their choices have to be presented. The others acting as members of different committees or as private citizens may analyze the views presented by some members of the class.

Related values/Identified values

- Dependence
- Quest for knowledge
- Spirit of enquiry
- Longing to know and understand
- Team work
- Love for nature
- Judicious use of natural resources

D. FLOW OF ENERGY IN THE BIOSPHERE

Having learned the different sources of energy of the living components in the ecosystems, focus on how energy stored in food during photosynthesis is utilized in doing various activities and how it is converted to some other forms by organisms in one trophic level to another. The following activities attempt to develop skills in model building using food chains as content, and in determining the decrease of usable energy within the food chain

Objectives:

- i To describe the conversion of solar energy in the biosphere into other forms of energy.
- ii To develop and explain a model of different food chains

Suggested Activities/Experiments:

Activity 1: Take two potted plants, cover one of it with black paper and keep the other in direct sunlight. Second plant will show proper growth compared to the first one.

Construct a diagram showing how green plants in the process of photosynthesis utilize solar energy. Discuss how the products get into the body systems of organisms.

Activity 2: Simulation Activity – Food Chain Game.

Have students play the card game called “food chain” which was prepared by UPSEC In this game, the players are given seven cards on

which pictures of plants and animals are drawn. Using these cards the players are supposed to lay down the cards one at a time to form a chain representing an eating and being eaten relationship. The cards of producer are laid down first. Another card representing an organism that eats it is placed next to it. Several food chains may be formed. The player who lays down all the cards or has the least number of cards in his hands is the winner.

Activity 3: Have students' research on food chains. Let them draw arrows and cut out pictures of plants and animals that comprise a food chain. Have small pieces of magnets attached to the arrows and pictures. Let the students present and explain their food chain to class using a magnetic board. Make them realize that food chains seldom go beyond four or five steps or trophic levels since less energy is passed onto the organisms in the next trophic level and that the longer the food chain the less energy is available.

Related values/Identified values

- **Interdependence**
- **Co-operation**
- **Keen observation.**
- **Struggle for existence**
- **Exploitation**

E. RECYCLING OF MATERIALS IN THE BIOGEOCHEMICAL CYCLES

This section primarily deals with the natural cycles, the gaseous, sedimentary and hydrologic, which ensures the continuous supply of some elements essential for life. The suggested activities are intended to emphasize how humans have disrupted the cycle and affected the availability of these elements. Some activities attempt to instill in the students' minds the need to ensure the continuous cycle of essential elements in the ecosystem

Objectives:

1. To trace the cycle of essential elements from their reservoir through the food chains and food webs and back.
2. To explain how man's activities have disrupted the different biogeochemical cycles.
3. To identify the various sources of water in the community and explore the possible alternative sources of water to increase the available water of the community.
4. To conduct researches and prepare reports on common problems that beset their communities.

Suggested Activities/Experiments:

Activity 1: Using diagrams or three-dimensional models of the different biogeochemical cycles, let students orally trace the cycles.

Activity 1(A): Let students prepare a chart or a three-dimensional model of the hydrologic cycle which shows how underground water reaches the surface and how man is able to utilize ground water.

Activity 1(B): Using the chart or model discuss how pesticides used in agriculture get into the bodies of living things including human beings. Let them state their position regarding this issue – If many of the pesticides used are harmful, should farmers still make use of them or not? Make them conduct a research on how pesticides should be used to bring about the least harm to the environment.

Activity 1(C): Recycling solid waste. Let students conduct an ocular inspection of the community to see if there is any problem on solid waste disposal. Allow them to find out where this waste comes from, where it goes and how it is disposed of. They should also find out if there are projects aimed to improve solid waste disposal in the community. Discuss whether these suggested projects will or will not cause other pollution problems in the area. Follow-up activities for this are:

- a. Finding out laws about trash and garbage disposal in the community and how well they are enforced
- b. A field trip to a waste disposal site that serves the community.
- c. Project for using recycled solid wastes.

Activity 1(D): Let students' research on how some human activities affect the biogeochemical cycles. For example: the effect of excessive logging of forests on the water cycle, the effect of combustion of fossil fuels on carbon and oxygen cycles, the effect of increased fertilizer production and use on the nitrogen cycle. Let students think of activities they themselves have been

doing such as throwing wastes into the river which somehow also disrupt the cycle.

Activity 2: Let the students do some of the following activities:

- a. Survey the different sources of water in the community.
 - b. Find out new sources of water being tapped. Make a list of all the ways in which you and other members of your family use water.
 - c. Classify the uses of water in the community into luxury or necessary uses.
 - d. Name ways by which water can be conserved (Survey which of these ways people in the community knows and practice).
 - e. Observe and describe the other physical characteristics of the water such as color, odor and turbidity from different sources.
 - f. Observe and collect some samples of organisms present in water reservoirs
 - g. Take note of the weather conditions in the area
 - h. Test the acidity or alkalinity of water using litmus paper or bromthymol blue or any acid indicator
 - i. Take water samples and place them in jars. Bring these jars to the laboratory for study
-
1. Allow the water in each jar to settle for 24 hours. Compare the amount of solids at the bottom in terms of the number of centimeters of sediments or let the water settle in a graduated cylinder or any calibrated glass jars

- 2 Examine a drop of the water samples under a microscope Draw and identify the organism you see Try to count the number of organisms in the drop.
- j. Study the quality of water in two sites Prepare a report based on the data gathered, comparing the quality of water of any two sources of locality. Find out which has more microorganisms Describe how the quality of water affects the organisms

In this activity it will be wise to make the students develop the skills needed in gathering data and preparing reports by making them observe and study water in an aquarium or a small creek prior to field trips for data gathering.

Activity 3: Take the class out to study a river. Identify two stations for the students to study, a station upstream and another downstream. Choose places where the students will detect differences in the quality of water. At these stations, let the students do the following tasks.

- a Collect samples of water from each station in separate jars Label and cover the jars and place them aside.
- b Measure the water temperature at the surface and at 50 cm below the surface of the stream.

Assign students in groups of five to research on selected topics. Each group is to represent a committee, which is assigned a topic or a problem of relevance to the community to study and research on, or to find possible solutions.

Some of these committees could be –

Committee to report on floods that occurs, their frequency, destruction and possible causes. The report should not only include observation but also what local/national officials have done or are doing to control floods and how effective these projects are.

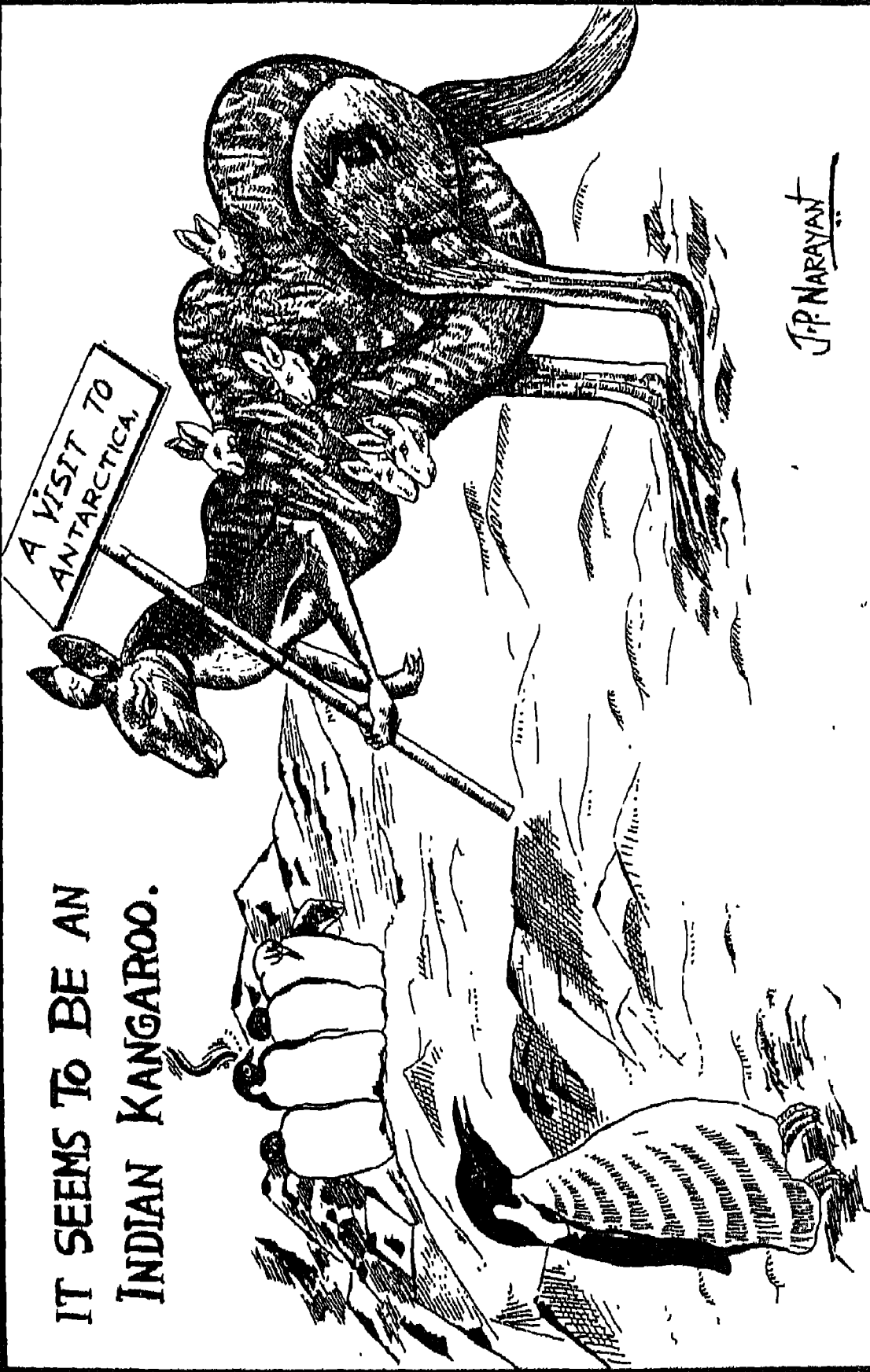
Committee on land use to study the way lands in the community are used. It should report the changes on the use of certain parts, for example, farmlands converted to subdivisions. This committee should study possible effects, both positive and negative, of the change.

Committee on food production to find out and suggest ways by which the community will be able to increase food production and preservation to reach self-sufficiency in certain items such as vegetables and meat products.

Related values/Identified values

- Skill
- Interdependence
- Co-operation
- Love for nature
- Reasoning

IT SEEMS TO BE AN
INDIAN KANGAROO.



J.P. NARAYAN

F. POPULATION DYNAMICS

The following activities attempt to make students realize that the finite resources of the environment cannot support the unlimited population growth on earth. Emphasis is on the limits to the number of people the earth can support and the rapid population growth as one of the causes of the numerous environmental problems the world is facing today.

Objectives:

- 1 To compare population growth in a developing and a developed country.
- 2 To become aware of the different environmental consequences of rapid population growth
3. To describe the different ways of controlling population growth.

Suggested Activities/Experiments

Activity 1(A): Make students graph the population growth of any five cities of India on the basis of data provided. Using the graph let them determine whether the growth is linear or exponential.

Activity 1(B): Let students construct age pyramids to illustrate age structure based on data obtained from the census and statistics department. Data can be analyzed to determine the ratio of the young dependents to the productive segment of the population, that is, the labour force. The analysis should be able to infer the true picture of the economic and social conditions of the country.

Activity 1(C): Let students perform an experiment to test the rate of population growth of any suitable organism. They can start with a certain number of living things (microorganisms) placed under a favourable environment and then counting the number of individuals during the given intervals of stipulated time periods. Unicellular algae and a suitable culture medium for their growth may be provided to students inside the biology laboratory.

Activity 1(D): Ask students to gather information about their villages or specified localities from the census and statistics departments on the following:

1. Total population
2. Average number of children per family below 14-years (male & female separately)
3. Age structure – (Number of persons under these age groups: under 18, 18-64, over 64)

Let students compute the dependency ratio (dependents are those under 18 or over 65) and interpret its economic & social implications

Activity 1(E): Conduct debates on such topics as

- a. The key factor in the numerous environmental problems we are facing today is due to rapid population growth
- b. Abortion should be/not be legally allowed

Activity 1(F): Students may be asked to present pictographically the concept of human population explosion syndrome. It should be depicted so as to trace the origin and genesis of all problems our society is facing today.

Activity 2(A): Discuss the environmental problems brought about by rapid growth of cities. Point out the positive and the negative effects on the various components of the environment. Bring out the following:

- a Enumerate the life styles of people that are detrimental to the natural environment.
- b. Can you mention your own life style that you think is not environment friendly?
- c How can your style of living be changed to help maintain a healthful environment?

Activity 2(B): Case Study

Present this problem to the class

The rapid growth in population has brought about increasing demands on the environment. Demands for food, water and energy are far greater now than several years ago. Energy is needed to increase production to provide employment and this demand has caused industry to look for alternative sources of energy. The more popular alternative source used in many developed countries and recently in a few developing countries is the nuclear power plant. Would you like one to be constructed in your country?

Group discussion analyzing the case should focus on the following.

- What are the advantages of putting up a nuclear power plant?
- What are its environmental hazards?

- What problems will the construction and operation of a nuclear plant create?
- Is a nuclear power plant necessary as an alternative source of power? Give our reasons.
- Are there other possible alternative sources of energy? Which of these alternatives can be utilized in your country?
- Would you suggest a most potent alternative source of energy in your country whose environmental cost is low but economic output is as good as nuclear power plant?

Activity 2(C): Traffic along the intersection of west Avenue and North Avenue has always been heavy. One sees the long line of cars and buses at peak hours. Findings show that petrol/diesel consumed for transportation is about 35.7% of total consumption of the community. With the increase in the price of oil, measures have to be taken to improve traffic conditions. A smooth flow of traffic is one way of conserving energy.

- a. Prepare a design or a model of a traffic system that will ensure smooth flow of traffic especially during the peak hours in this intersection.
- b. Explain, using the design, how clogging of traffic can be smoothed out.

Activity 2(D): On the problem of garbage disposal resulting from rapid population growth, let students play the role of a garbage collector, a municipal engineer, a building contractor, and a businessman. Each one has a proposal and brings out its advantages to convince the members of the municipal council to accept the idea and approve its funding. Ask the rest of the class to act as the members of the municipal council.

Present this problem to the class.

Assume that the community in which you live is located on the seacoast. As the population increases, your town is faced with the problem of garbage and waste disposal. The district engineer and the people in the community disagree on how to dispose of the garbage so people are requested to present their proposals to the members of the municipal council. The proposals are as follows:

1. Garbage collector – hauling the garbage out to the sea and dumping it.
2. Municipal engineer – using trash and garbage to fill part of the bay to provide additional building sites.
3. Building contractor – using trash and garbage to fill lowlands around the town and make them suitable for building sites.
4. Businessman – compressing the trash and garbage into blocks then covering them with concrete and using them as building materials.

To the municipal council:

What position would you take on each of these views and why? What alternative/s would you suggest?

Activity 3(A): Discuss the different ways of controlling population growth, namely: conception control, birth or fertility control and population control. Bring out the various considerations in the choice of growth control method. Other considerations are: scientific readiness, political feasibility of the

method, ethical feasibility, the short and long-range consequences, and the effectiveness of the method.

Activity 3(B): Present this case to the class

Suggestions are now being made to control the population of large towns by building new and smaller towns in less populated regions of the country. Certain large industries would be invited to build factories in each new area to provide jobs for the new residents. Supporting businesses, such as groceries, utility companies, clothing goods and many others, would supply the needs of each new town. These new towns would expand to a limited size according to a plan based on predicted population increase. Pollution control could be begun as soon as the first citizen arrives.

Suppose you are one of the planners for such a town. You are to help decide where it is to be located and what large industries to include. Where to set up the systems for water supply, sewage control, power supply and transportation are all under the control of your planning group. You and the other planners must also decide location of industries, businesses, and schools.

Consult with your classmates in setting up your planned community. Assume that your town will start with 500 families and permit an increase in total size of 100 new families during the next 10 years. Here are just a few of the problems you will face.

- a. From where will the town receive its food and water? Will the amounts to be made available sufficient for the community and its projected increase?

- b What responsibility will your town have to the nearest neighbouring towns?
- c. What are creational facilities will be provided?
- d. What will be the source of power for the town?

This task will take much time and effort. You will see that being a town planner is a tough job and will require answering a hundred other questions. Your task won't be complete until you and your group has prepared a written plan. Be sure to include sketches of the proposed layout for the new town.

Related values/Identified values:

- Co-operation
- Creativity
- Love for nature
- Quest for knowledge
- Future planning

G. HUMAN INTERVENTIONS IN ECOLOGICAL PROCESSES

The functions and activities of human beings have greatly affected the quality of the environment. There is a need, therefore, to make everyone aware of the behaviour patterns and attitudes that bring about negative effects to the ecosystem. These negative effects should be avoided. Those activities which result in the improvement of the environment should be understood and reinforced.

Objectives:

1. To increase student awareness of the possible causes of degradation of the environment
2. To show how an increase in the amount of detergents in water affects the living things in it
3. To conduct a solid waste disposal survey in the community.
4. To analyze given problems and be able to suggest alternatives or possible solutions.

Suggested Activities/Experiments

Activity 1(A): Ask students to collect newspaper clippings or magazine articles about projects being undertaken or decisions being made for political reasons which may have an adverse effect on the environment.

Activity 1(B): Cite examples of situations where owners of large factories have manifested the higher value they have placed on economic goals than environmental quality. Discuss what actions could be taken by the people who are affected or by the government against these violators.

Activity 1(C): Present news reports or clippings taken from newspapers or magazines or even photographs of current situations indicating signs of impending crises. Ask students to examine each photograph, draw inferences from the details and answer questions such as

- a. Can you identify the signs of a coming or a current environmental crisis shown in the photograph?
- b. Is there anything which seems to show or indicate that something is growing too fast? Which factor/s seem to be growing exponentially?
- c. Can you tell how this change will affect the quality of the environment? The quality of living things in the environment?

Activity 1(D): Present photographs of parts of the students' communities such as barren field, plaza filled with people, congested area with factories emitting smoke, a highway with an unbroken line of cars, and malnourished children. Then ask the question – which of these environmental stresses are parts of your environment? Based on your students' answers determine their level of awareness of the environment.

Activity 2(A): Discuss why the following activities may help increase world food supplied but may not solve the problem of food shortage or may create other environmental problems.

- a. Cultivation of more lands
- b. Sea farming
- c. Making synthetic food and animal protein substitutes
- d. Irrigation of dry lands

Activity 2(B): This problem on food shortage can be presented to the class for them to analyze and discuss. Based on the discussion, the students should be able to come up with possible recommendations and solutions to the case under study.

The food supply in many developing countries is still scarce in spite of the reported yearly increase in food production. Two reasons for this food shortage are: (1) insufficiency of food being produced and (2) spoilage of food during storage and distribution. How can these problems be solved? Let students report on the various methods used to increase production and decrease loss by spoilage

Activity 3: Let students collect as many photographs or newspaper pictures as they can show changes in the environment due to human activities. Using the photographs let the students identify the human behaviour that caused this and classify them by putting a plus (+) sign to the activities that help maintain a healthful environment and a negative sign (-) to those that are damaging to the environment, after each activity Let students collate and analyze the data, and prepare a report on their findings. A survey with the same objective as the photograph collection can be administered on a larger scale by using statements that describe the activity instead of photographs and making the respondent put a check (✓) in the appropriate column

	Effect		
Example: Throwing waste into the water	(+)	(-)	(Not sure)
	_____	_____	_____
		√	

Perhaps the survey can include the same statement but this time the respondents are asked to check (√) those they practice.

	Yes	No	Don't know
Example: Throwing waste into the river	_____	_____	_____
	√		
Burning trash in the backyard	_____	_____	_____
		√	

Activity 4: Let students perform the following experiment to find out the effect of detergents on living things in a pond.

Half-fill six jars with pond water. Add daphnia or any small fish as guppies, elodea or hydrilla plant and some algae in each jar. Number the jars 1 to 6. (If the small fish begin to show ill effects from the experimentation, they should be removed and placed in an aquarium or other tank of water).

Dissolve a teaspoon of detergent in about 150 ml of water. Add 5 drops of the solution in jar 1, 15 drops in jar 2, 25 drops in jar 3, 40 drops in jar 4, 90 drops in jar 5. jar 6 which contains pond water only serves as the control

Place the six jars in sunlight. Observe and record your observations everyday for two weeks.

The discussion that follows the experiment should bring out (1) the effect of increasing amount of detergent on living things in the pond, (2) the

probable effect of the growth of algae (algal bloom) on the system in terms of biological oxygen demand and how this leads to the polluted state of the water. Prior to discussion of water pollution bring out the meaning of pollutants and their detrimental effects on the color, turbidity, hardness and temperature of the water and the effects of these changes on the conditions in it. Some examples of these effects are the differences in the amount of sunlight that water can transmit at various depths and the ability to absorb gases from the air. A field trip to an actual site where these things are taking place may be undertaken. Possible sources of phosphates, nitrate and other pollutants may be identified.

Activity 5: Ocular inspection of the community to see if there is a problem of solid waste disposal. Let students find out what happens to the solid waste from homes – where it goes, how it is disposed of, whether there are projects aimed to improve solid waste disposal. Let students speculate on whether their community will have a problem of waste disposal in the future or not and let them explain why.

Activity 6: Present those situations and let students express their views based on the role they play.

Activity 6(A): A province with a small population is almost completely without industry and depends only on agriculture for its income. The amount of tax money available to the province is not enough to provide quality education for its children. To increase the provincial tax income, the governor has invited industry to build plants there.

Activity 6(B): A mining company discovered huge deposits of coal in a provincial recreation area near a lake in the province. A well-known

electrical company, therefore, feels that the provincial recreation area is also an ideal place for a new power plant. The coal removed by strip-mining can be used as fuel. Water from the lake can be heated and the steam produced can be used to turn turbines. Used water can be returned to the lake. The electricity will be sold to the province at a lower price. The total money of the province would increase by 25%. The power plant will provide electric power to surrounding provinces.

Discussions should point out the following:

- a) What are the probable effects of these industries on the air, water and land in the nearby areas?
- b) What requirements should be placed on such industries?

Activity 6(C): A strange fungus has suddenly attacked large areas in a certain farming region. The farmers want to use large-scale spraying of insecticides in order to kill the fungus, save their crops, and prevent further spread of the disease. Other people are protesting the use of the insecticides. They think the infected crops should be burned in order to kill the fungus. Of course, the farmer's crop would then be a total loss.

What are the advantages and disadvantages of either choice? What would you suggest as a solution?

After regarding and, hopefully, trying out some of these activities and experiments, the teacher/supervisor trainee is enjoined to write on original activity/experiment setting it in his own locale. He may present the activity/experiment to his fellow trainees for their critique and suggestions for improvement.

Related values/Identified Values:

- Awareness of nature
- Thoughtfulness
- Cleanliness
- Love towards nature
- Sense of social responsibility
- Value for national and civic property
- Value of responsibility

NUCLEAR TEST.

THIS TEST PROMISES
A VARIETY OF TASTES.



ENVIRONMENTAL EDUCATION: ITS NEED, GOALS AND OBJECTIVES

“Education is all round development of Man” so said Father of the Nation Mahatma Gandhi. Education unfolds as it were ones latent talents and capabilities. It is a process of continual adjustment of one to oneself to society and to his environment Adjustment is an active process with a positive approach. Education makes one sensitive to one’s surroundings, enables one to cherish values in life and inculcates in one a catholicity of outlook. Environmental factors shape the individuals development Education thus means much more than giving mere instruction. It brings out the capabilities and potentialities of the child and channelises them toward a higher and nobler life. It sets afoot development from within It helps the flowering of the genius in him It is character building. It promotes self-reliance and self-confidence

World educators and environmental specialists have repeatedly point out that any solution to environmental crisis will require environmental awareness and understanding to be deeply rooted in the educational system at all levels EE constitutes a comprehensive, lifelong education, one responsive to changes in a rapidly changing world. It prepares the individual and communities for life, through an understanding of the major problems of the contemporary, complex world, the problems resulting from the interaction of the biological, physical, social, economic and cultural aspects of the individual and the communities. EE provides the skills and attitudes needed to play a productive role in improving life and values.

EE looks outward to the community. It involves the individual in an active, problem – solving process with a sense of responsibility and a

commitment to build a better tomorrow. By its very nature, EE can make a powerful contribution to the renovation of the educational process. In order to achieve these goals, EE requires a number of specific actions to fill the gaps which exist in our present education system. Special attention should be paid to understanding the complex relations between socio – economic development and improvement of the environment.

For this purpose, EE should provide the necessary knowledge for the interpretation of the complex phenomena that shape the environment, encourages those ethical, economic and aesthetic values which, constituting the basis of self – discipline, will further the development of the environment. It should also provide a wide range of practical skills required in the devising and the application of effective solutions to environmental problems.

Education and Environment:

It can hardly be gainsaid that environment influences one's education. The interaction between education and environment can be described as follows:

- (a) Education creates the urge for a clean environment.
- (b) It inculcates in the young minds the basic principles of sanitation and hygiene.
- (c) It helps pupils and students appreciate the need for conservation of our multifaceted heritage.
- (d) It teaches newer and environmentally safe technologies.

Need and Justification for Environmental Education (EE)

Environmental and man have been two inseparable entities ever since the appearance of the latter on the scene. They have been interacting, and the sensitive relationship between them was operating harmoniously because the limited needs of our ancestors could be met from the surroundings themselves. The functioning of nature was undisturbed largely because the number of human beings was small and their demands on the environment and its resources were also insignificant. The only damaging actions of man against environment were probably limited to making a fire, hunting and poaching.

Later on, he started settling down and cultivating food rather than wander in search of it. Though this led to development, yet due to man's limited knowledge, the side effects of poor management of land and other resources were not foreseen. These settlements, besides providing the basic necessities of life, gave enough time to man to think of the ways of extracting more and more from the environment for comfort and luxury. The fast development and progress in the name of prosperity gave man extensive powers to misuse the environment rather than make its judicious case for human betterment.

Interestingly, man in the beginning sought only the knowledge about his environment and was concerned about living with it peacefully but his actions afterwards led to reckless exploitation of nature. In certain cases it seems he has already done permanent and irreparable damage to the environment. The whole spectrum of his damaging activities is seen in the large-scale destruction of forests, loss of fertile soil through erosion, frequent floods, shortage of fuel, energy crises, pollution, extinction of living species,

poorly planned industrial and urban development and much more. The list is ever growing. It has resulted in an overall ecological/environmental crisis, wherein not only the environment is being degraded but also the very survival of the human species is threatened. It appears that the world dominated by the mind (Noosphere: Noosmind) is fast replacing the naturally evolved world (biosphere).

In some areas human efforts have led to fast development resulting in environmental imbalance while other areas still experience environmental problems on account of underdevelopment. At present it seems that both the over development due to thoughtless planning and the underdevelopment due to shortage of resources are responsible for environmental deterioration. Man now looks at the environment with greed rather than for his needs. The reckless exploitation of the environment may soon create a point of no return, and we may find ourselves helpless to retrieve the situation. Some environmental situations need immediate remedial measures for preventing the furtherance of environmental problems

We all must realize our responsibility towards the environment and appreciate the need for its protection and preservation. Let us leave behind a good legacy of a healthy environment for the future generations. The time is ripe for us to review our relationship with the environment and bear in mind that the environment cannot be exploited beyond certain limits. The misconception that the environment can be used to the maximum must be shed because as a result of our damaging actions the environment is losing its recuperating power fast.

One mode of reviewing our relationship with the environment could be to assess how much correct information we have about it. Another could

be to analyse our own skills for solving environmental problems, in view of the present environment from the man-made disasters. For example, the studies carried out in the recent past have shown that human activities are interfering with the basic ecological principals like flow of energy and mineral cycling. The shortening of food chains and making nutrient cycles acyclic may be the root cause of the present environmental crisis.

The question now arises: how could we achieve the aims of having better knowledge of the environment, gain appropriate skills to employ the knowledge, and initiate actions leading to judicious use of environment without disturbing the ecological balance? If we are to prepare environment conscious citizens it will be difficult to ignore the role of educational systems which are well known pathways of disseminating knowledge and preparing better individuals. People, the world over, have realized the critical role of education in solving the environmental crisis. Society as a whole has a whole new expectations from the educational system and its role in the amelioration of the present environmental crisis. Education today should have greater relevance to the environmental realities which may strengthen its ethical function. The fulfillment of these expectations will have both short term and long-term significance for preparing individuals who could keep the environment healthy and safe. Education must enable the citizens to design, devise and plan actions which are in harmony with the environment.

Education of, about and for the environment will definitely help individuals to realize their responsibility, not only towards their fellow beings, but also towards the total environment. The new term 'environmental education' is really not a new concern for the environment as far as learning is concerned. It was practised at all levels of learning especially in informal ones. It has also been pointed out by educationists that it would not be

considered another type of education. It is only for renewing the emphasis on environment and the related issues in the educational system as such. In other words, it is also considered a new approach to education with more emphasis on the identification and development of values and classification of concepts, in order to develop problem-solving skills leading to the understanding of the interdependence of man and his biophysical surroundings.

Thus the environment may become a focus of education at all levels. The young learners in the primary school generally learn through observation, which includes actions of others. Children in their surroundings come across large numbers of environmental situations and actions like cleanliness and disposal of wastes. They may develop attitudes and commitments to such situations by watching the actions of their elders. The primary stage is considered to be a sensitive stage for learning and for forming attitudes. It may be easier to develop right attitudes among children rather than change the attitudes among adults. Imparting environmental education to primary – school children thus assumes significance.

Philosophy, goals, general objectives and guiding principles of EE

Philosophy

Education at present does not prepare individuals for better management of their lives vis-à-vis the environment in which they live. Moreover, the scientific knowledge gained by man has helped him to a great extent by providing material comforts, increasing life expectancy, controlling diseases, developing new economic varieties (high yielding, fast growing and disease resistant) of plants and animals. But unfortunately in the

process many environmental problems have crept in as byproducts, knowingly or unknowingly. Now it is felt that all the environmental problems may not be solved in spite of the availability of advanced scientific and technological knowledge. As a note of caution Buzzati-Traverso (1977) has rightly pointed out that the problems at hand are far greater than our ability of understanding and solving them with knowledge at hand.

EE can help in preparing individuals who are more aware of their environment and its problems and are able to understand man-environment relationships from a more human point of view and act wisely while making decisions. This would require bringing education closer to the realities and relevance to life which would further help in improving man's contact with the physical and social environment. Moreover in adding an environmental dimension to general education would help in restoring its ethical function. Aldo Leopold (1933) in his writings on conservation ethics mentioned that with regard to environment, 'yet there is no ethics dealing with man's relationship to land and to the non-human animals and plants which grow upon it. The land relation is strictly economic entailing privileges but not obligation'. In the wider context this is perhaps true even today.

This calls for new ethics in educational systems. The educators, philosophers, scientists and environmentalists today still feel that in spite of the best intentions and seriousness it will not bring expected results till a new ethical order in environmental values is identified and integrated with all our activities including science, technology, politics, development and education. The past prescriptions by religious preachers and thinkers to keep the environment clean and healthy do not work in the present cultural settings because of fast cultural changes.

The major share of the blame for the present environmental crises goes to man. Our activities leading to environmental degradation clearly indicate no change in our attitudes, thinking and ethics towards environment. Aurellio Peccei (1975) has rightly mentioned that 'the bulk of mankind now feels estranged from what it has created and frustrated by unaccustomed realities which escape its control and comprehension. The more this situation develops, the greater the danger for it to end in anger or in collapse'. The Tbilisi conference also called for a positive and enriching influence of environmental ethics and values through the development of EE.

In a true sense a more sympathetic and serious view of the intricacies of human, relationships with the environment and vice versa would need an attitudinal change, new commitments, respectable behaviour leading to a new ethical order. The new ethics, as far as environment is concerned, expects man to be only a part of the total environment and not the whole. It would probably provide a new philosophical basis for contemporary educational renewal

Goals and objectives:

The need for having well-established EE programmes focusing on humanity's relationship with the environment has been discussed earlier. If we see the efforts made in the past decade or so, it becomes very clear that any educational programme designed with an environmental dimension should be based on the identified and agreed upon aims and objectives agreed upon aims and objectives keeping in view the holistic nature of the environment

The first serious attempt in this direction was made by the Belgrade workshop (1975). It identified, in its charter, the major goals and general objectives of providing education about the environment and the related issues. The workshop elaborated the expectations of the society from EE as 'to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solution of current problems and prevention of new ones'

The Intergovernmental Conference on EE organized by UNESCO in collaboration with UNEP in Tbilisi, USSR, in October 1977 endorsed the following goals, objectives and guiding principles for EE

1. The goals of EE are:

- (a) to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- (b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;
- (c) to create new patterns of behaviour of individuals, groups and society as a whole towards the environment;

2. The categories of EE objectives:

Awareness:

To help social groups and individuals acquire an awareness of an sensitivity to the total environment and its allied problems.

Knowledge

To help social groups and individuals acquire a set of values and feelings of concern for the environment, and the motivation for actively participating in environmental improvement and protection

Skills:

To help social groups and individuals acquire the skills for identifying and solving environmental problems

Participation:

To provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems.

3. Some guiding principles for EE:

EE should:

consider the environment in its totality – natural and built, technological and social (economic, political, technological, cultural-historical, formal, aesthetic);

be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages,

be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective,

examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas;

focus on current and potential environmental situations, while taking into account the historical perspective;

promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems;

explicitly consider environmental aspects in plans for development and growth,

enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;

relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years,

help learners discover the symptoms and real causes of environmental problems,

emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;

utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.

LIST OF PARTICIPANTS

List of participants who attended the workshop entitled “Review of Formulation of Activities and Experiments for Teaching-Learning Various Aspects of Environment and Related Values at Secondary Level” in third phase of the Project at RIE, Ajmer.

Sr. No.	Name	School
1.	S K Lal	Military School, Ajmer
2	Ravindra Sharma	St. Anselm's School, Ajmer
3.	Uma Bhargava	Savitri Girls School, Ajmer
4.	K. K. Upadhyay	Kendriya Vidyalaya No. 2, Ajmer
5.	Nusrath Fathima	Mayoor School, Ajmer
6.	Rajni Yadav	Mayoor School, Ajmer
7	Savita Sharma	Maheshwari Public School, Ajmer
8.	Sabita Ratan	St. Mary's Convent School, Ajmer
9.	Shweta Saxena	St. Mary's Convent School, Ajmer
10.	Savita Pandey	Mayo College Girls School, Ajmer

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